

106 CONTROL OF MATERIALS

106.01 SOURCE OF SUPPLY AND QUALITY

Only materials meeting the requirements of these specifications and approved by the Engineer shall be used. Materials may be subjected to inspection or test at any time during their preparation for use.

The materials used on the work shall meet all quality requirements of the contract. In order to expedite the inspection and testing of materials, the Contractor shall notify the Engineer of his proposed sources of materials prior to delivery. At the option of the Engineer, materials may be approved at the source of supply before delivery is started. If it is found that sources of supply for previously approved materials do not produce specified products, the material and/or source of supply may be rejected.

The entire output of any source of supply may be rejected when a continuous supply of satisfactory material cannot be obtained.

Unless specifically approved by the Engineer, material sources shall not be changed in the course of a project.

Approval of a material for a particular purpose, use, or project in a specified manner does not constitute approval for its use for any other purpose, project or manner.

Materials which appear defective upon arrival shall not be used until approved. All rejected materials shall be promptly removed from the site.

106.02 SAMPLES, TESTS AND CITED SPECIFICATIONS

All materials shall be inspected, tested and accepted by the Engineer before incorporation in the work. Any work in which untested or unaccepted materials are used will be performed at the Contractor's risk and may be considered as unacceptable and unauthorized work.

The Contractor, when directed by the Engineer, shall furnish material samples for inspection or testing. These samples may be required prior to or during the use of the material or at any time prior to acceptance of the work. Unless otherwise designated, materials shall be sampled and tested in accordance with the requirements of the standards which are current on the date of advertisement for bids.

Samples shall be taken in accordance with the following:

1. Samples of untreated aggregates or soils shall be taken from the road at the laydown machine prior to compaction.

2. Samples of bituminous mixtures shall be taken from the road at the laydown machine and/or from the plant out of the truck; for the determination of gradation, bituminous content, and other properties as specified. In addition, the contractor shall furnish test samples cut from the compacted mixtures (2 per city block) at locations designated by the Engineer. The contractor shall repair the areas from which the samples were cut at no additional cost to the District.

3. Samples of portland cement concrete shall be taken from the hauling unit at the project site for the

determination of slump and air content, unit weight and for the fabrication of test beams and cylinders.

4. Samples of cement-treated and lime-treated materials shall be taken from the road at the laydown machine prior to compaction for the determination of gradation, moisture content, unit weight and the fabrication of test cylinders.

5. Tests for density shall be made after the compaction process has been completed.

6. Thickness determinations of pavement layers shall be made on the road, by coring or test pitting, after all compacting and processing has been completed.

7. Manufactured materials such as portland cement, steel, hydrated lime, bituminous materials, paint, materials used in signs, lighting and traffic signals may be sampled at the producer's plant. Before final acceptance, such materials shall be subject to inspection and further testing after delivery to the project as determined by the Engineer. Project samples shall be taken before the material is incorporated into any other product.

Where sampling and testing of a material prior to use is required by the Engineer, the Contractor shall provide the necessary samples sufficiently in advance of contemplated use for testing and approval. Samples shall be delivered to the location as determined by the Engineer. Material samples shall be submitted with the appropriate project name, source of material, and intended use of material.

When samples are taken at the job site by the Department's personnel or by any personnel of a materials testing firm employed by the Department to obtain such samples for testing, the Contractor shall provide sufficient personnel of his employment to convey the samples from the sampling location to the vehicle waiting to transport them for testing, and load the samples upon the vehicle for shipment to the testing laboratory. All costs to the Contractor for assisting in this effort shall be absorbed as part of the payment made for the item for which the material is being furnished.

Table 106.02 gives the minimum sampling requirements for materials for test.

Longer times required to test materials does not waive any specification requirements for the material or work.

New materials sources or non standard materials are job dependent.

TABLE 106.02
MINIMUM SAMPLING REQUIREMENTS FOR MATERIALS

MATERIAL	MINIMUM SAMPLE REQUIRED	WORKING DAYS TO OBTAIN VERBAL TEST RESULTS
Admixtures (Portland Cement Concrete)	See 814	
Aggregate, Coarse (PCC & Asphalt)	70 pounds	5
Aggregate, Fine		
Bituminous	20 pounds	5
Blanket	10 pounds	
Concrete	20 pounds	
Filter	10 pounds	
Mortar	10 pounds	
Vertical	10 pounds	
Aggregate, Source (new)	200 pounds	60
Anchor Bolts	1 specimen per lot	6
Asphalt Cement (complete)	Standard 16 oz. can	5
Asphalt Cores	Job Dependent	1
Asphalt, Cut-Back	1 quart	5
Asphalt, Emulsified	4 quarts	5
Asphalt Primer for Waterproofing	1 quart	5
Asphalt Seal Coat for Waterproofing	1 quart	5
Bituminous Mixtures	12 pounds	12
Job Mix Formulas	75 pounds	21
Brick:		
Building	10 specimens	12
Sewer	10 specimens	12
Burlap	3 foot length x width of roll	4
Caulking Compound	1 pint	20
Canvas	2 square yards	4
Ceramic Tile	25 specimens	40
Concrete Mix Design	6 cubic feet	50
Concrete, Wet (Dunagan)	30 pounds	
Dowel Bars	3 specimens	6
Electrical Items	Job Dependent	
Expansion Joint Filler	3 foot length x width (4-1/2 inch min.)	16
Gravel	70 pounds	
High Tensile Strand (or wire)	5 foot length	11
Load Transfer Devices	1 specimen	6
Masonry Cement	10 pounds	16
Membrane (liquid) Curing Compound	1 quart	6
Mineral Fiber	5 pounds	5
Paint and Coatings (2)	4 - 1 quart cans	30
Pipe:		
Clay	2 specimens	6
Concrete		

Polyethylene Sheeting	2 yards x 10 inches	11
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TABLE 106.02
MINIMUM SAMPLING REQUIREMENTS FOR MATERIALS
(Continued)

MATERIAL	MINIMUM SAMPLE REQUIRED	WORKING DAYS TO OBTAIN VERBAL TEST RESULTS
Portland Cement	10 pounds	
Preformed Bearing Pads	4 inch x 4 inch	
Prestressed Reinforcement	Per Section 815.02	
Reinforcing Steel:		
Bar Nos. 2 through 9	1 specimen 5 feet in length	6
Bars larger than No. 9	1 specimen 7 feet in length	6
Saturated Cotton Fabric	4 foot length x width of roll	6
Sealing Compounds:		
Cold Poured, Emulsion	1 quart	16
Cold Poured, Mastic	1 quart	16
Cold Poured, Two-component	1 quart	20
Hot Poured	5 pounds	16
Shear Connector Studs	1 specimen	
Soils:		
Gradation LL and PI	20 pounds	5
Gradation and Proctor	100 pounds	6
Top Soil	20 pounds	11
Subgrade Paper	3 foot length x width of roll	6
Tar (Creosote) Primer for Waterproofing	1 quart	6
Tar, Road	1 quart	6
Tar Seal, Coat for Waterproofing	1 quart	6
Tie rod assemblies	3 specimens	6
Waterproof Paper	2 square yards	11
Waterstop, Rubber	2 square feet	11
Waterstop, PVC	2 square feet	30
Welded Wire Fabric	3 feet x 3 feet	6
Miscellaneous Materials and Tests:		
Determining Thickness of Metals	Representative sample	6
Determining Unit Weight of Metals	Representative sample	6
Determining Thickness of Galvanizing	Representative sample	6
Identification of Wrought Iron	Representative sample	2
Infra Red Spectrum		

106.03 MATERIALS COMPLIANCE CERTIFICATION

The Contractor shall furnish material compliance certifications for all manufactured materials obtained from vendors or producers, prior to their incorporation into the work.

The Contractor shall submit certificates to demonstrate proof of compliance with requirements for products and materials, qualifications of personnel, and results of testing. Each certificate shall be signed by an official authorized to certify on behalf of the issuing organization. Certificates shall show the name and address of the Contractor, the Project identification (Invitation Number, Project Description and Federal-Aid Number(s), if applicable, as shown on the title pages of the Specifications and Bid Proposals) and, if for a material, the quantity and date(s) of shipment to which the certification applies. Certificates shall not be construed as relieving the Contractor from furnishing satisfactory material if in subsequent testing of samples the material does not meet specified requirements. The original and two copies of all certificates shall be submitted unless otherwise specified.

The contractor shall certify monthly that the Portland Cement, Portland Blast Furnace Slag Cement, Coarse and Fine Aggregates, Admixtures and Water conform to the source, quality and grading as stated on the current approved job mix formulae and the contract documents.

The Engineer may permit use prior to sampling and testing of certain materials or assemblies accompanied by certifications stating that such materials or assemblies fully comply with the requirements of the Contract. The certificate shall be signed by the manufacturer. Each lot or assembly delivered to the work must be accompanied by a certification in which the lot is clearly identified.

Materials used on the basis of certifications may be sampled and tested at any time and if found not to be in conformity with contract requirements will be subject to rejection whether in place or not.

106.04 PLANT INSPECTION

The Department shall have full access at all times to those parts of materials sources, asphalt and PCC plants, steel fabrication shops and precast facilities as may concern the production and manufacture of materials and products needed for the Contract.

The Contractor shall notify the office of the chief plant inspector 24 hours before concrete or asphalt is to be delivered to the project site. In the event that delivery is suspended for an indefinite period a 24 hour notice is also required in advance of a resumption of delivery.

106.05 QUALITY CONTROL OF PLANTS

The Contractor shall assume the responsibility for the quality control and condition of all material during the handling, blending and mixing operations. The Contractor shall assume responsibility for the initial determination and all necessary subsequent adjustments in proportioning of materials used to produce the specified job-mix. The Contractor shall have available the testing equipment necessary to perform stockpile and hot bin analysis (asphalt) or bin samples (PCC) required below.

The Department's Inspector will never assume by act or word the responsibility for mix control adjustments, calculations or the setting of dials, gages, scales and meters. Such duties are to be assumed only by the Contractor. Tests for conformance with the specifications may be made on samples of the materials entering into the composition of the mix, samples of the mixture, and samples cut from the

completed pavement. The Contractor shall cooperate with the Engineer in obtaining these samples. When samples are cut from the pavement, the voids caused by the cuts shall be replaced and refinished without additional compensation. The preparation of all bituminous mixtures and portland cement concrete mixes shall be subject to inspection at the plant. For this purpose, the Contractor shall provide an acceptably furnished and equipped laboratory in accordance with the requirements of 106.06(A).

Generally, the testing of bituminous and PC concrete mixes at the plant is provided by the Department as a routine check upon the adequacy of the Contractor's quality control procedures.

In lieu of an acceptance program involving continuous sampling, testing, and weight verifications at the source, small quantities of material may be accepted by the Engineer based upon continuous or occasional sampling and testing at the source, supplemented by visual examination at point of delivery; and, based upon weights furnished by the Contractor (or supplier) on the weight tickets. The frequency of sampling, testing and weight verification by an Inspector at the source will be established by the Engineer based upon the Department's current acceptance program and local conditions encountered.

106.06 FIELD FACILITIES

(A) ASPHALT AND PCC PLANTS. The Contractor shall furnish and maintain a laboratory wherein approval testing for mixture composition will be performed by the Department at the location(s) approved for plant processing of material at the Contractor's expense. The Contractor may utilize the laboratory and equipment for the purpose of performing quality control testing; however, in the event the dual testing programs overlap in such a manner as to interfere with the check and acceptance tests to be performed by the Department, the Department shall have priority in the use of the facilities and equipment. Only one laboratory will be required by the Department per plant regardless of the number of contracts from which the material is being processed.

The plant laboratory and equipment furnished by the Contractor shall remain the property of the Contractor. Equipment furnished by the Contractor shall be subject to inspection and calibration by the District at anytime during the contract performance period. Test equipment found not to be in calibration and proper working condition shall be adjusted, repaired or replaced immediately to the satisfaction of the Engineer. The space provided for the plant laboratory shall be used for laboratory purposes only. The laboratory shall be erected before the processing of material begins and shall be available throughout the duration of the plant operation. It shall be removed upon completion of the project, if located on the project.

The laboratory shall be of weatherproof construction, tightly floored and roofed, and constructed with an air space above the ceiling for ventilation.

The width of the laboratory shall not be less than 8 feet and the floor-to-ceiling height shall not be less than 6 feet 6 inches. The floor space shall be not less than 160 square feet, with a minimum working area of not less than 140 square feet. The inside walls and ceiling shall be constructed of plywood, masonite, gypsum board, or other suitable materials. Walls and ceiling shall be insulated.

The laboratory shall contain at least 2 windows, each having an area of not less than 540 square inches, can be easily opened and secured from the inside only. The laboratory shall contain at least one door. Both window and door screens shall be provided. The door(s) shall be equipped with lock(s) and at least 2 keys for each lock shall be furnished to the Engineer.

The laboratory shall have satisfactory lighting, telephone, heating equipment, water supply, exhaust fan, air-conditioner and electrical outlets (120 V and 220 V) and shall be connected to an operational power source.

Heating and air conditioning equipment shall maintain a temperature of not less than 68°F and not more than 78°F.

The capacity of the exhaust fan shall be such that it will exhaust, each hour, a volume of air equal to at least 10 times the cubical volume of the laboratory. Fuel for the heating equipment and electrical current shall be furnished by the Contractor. The Contractor shall also furnish and maintain one chemical type and one 2-1/2 gallon pressurized water fire extinguisher of standard commercial quality.

A suitable indoor toilet connected to a sanitary sewer shall be provided. If a sanitary sewer is not available a suitable outdoor toilet conforming to the requirements of the Board of Health, or other bodies having jurisdiction in the area, shall be provided.

In addition to the general requirements stated herein, the laboratory shall be equipped with the following:

No.	DESCRIPTION
1	Work bench (96 x 30 inches)
1	Desk (60 x 34 inches)
1	Sink connected to operational water source with approximate dimensions: length 24 inches; front to back 18 inches; depth 8 inches
1	Printing electronic calculator
1	Metal, 4 drawer file cabinet (15 inch drawer width)
2	Chairs
1	Waste basket
1	Pencil sharpener
1	First aid kit
1	Potable water supply
1	Eye wash station connected to a potable water supply (asphalt laboratory)

The Contractor will furnish the following minimum testing equipment:

1	Centrifuge extractor (3,000 grams capacity) or equal
2	Electric hot plates thermostatically controlled with 3-way plug and cord
1	Triple beam balance with scoop, capacity 2600 grams
1	Triple beam balance with scoop, capacity 20 kilograms
1	Set of sampling equipment, steel buckets, square nose shovel, sampling thief and sampling bags
1	Mechanical sieve shaker for 8 inch diameter sieves, 2 inch through No. 200 mesh
1	Set of brass frames, 8 inch diameter sieves, 2 inch through No. 200 mesh
1	No. 200 Wet Washing Sieve, brass frame 4" height above mesh
1	Sample Splitter with opening to one and one half inches
1	Mechanical Shaker, with the following screen tray sizes: 2", 1-1/2", 1", 3/4", 1/2", 3/8", No. 4, No. 8, No. 10, No. 16 and pan; and also, for asphalt plants, the following specified equipment which shall conform to the requirements of AASHTO T 245.

- Concrete thermometers
 - 3 Specimen Mold Assembly
 - 1 Specimen Extractor
 - 1 Compaction Hammer Mechanical Compactor with counter and pedestal
 - 1 Safety can, 2-1/2 gallon capacity
 - 1 Lab Type Oven
 - 2 Dial Type Asphalt Thermometers
- Extraction fluid Conforming to AASHTO T 164. Used extraction fluid shall be disposed of by the contractor in conformance with Federal and City laws.

Miscellaneous supplies; pans, brushes, scoops or large spoons, trowels, graduated beakers and an adequate supply of running water shall be provided. The equipment specified shall be installed ready for operation in a field laboratory conforming to the above requirements.

Adjacent to the platform scales at Asphalt Plants, the Contractor shall furnish a platform of sufficient height for checking mix temperatures and operations.

(B) STEEL FABRICATION SHOP. The Contractor shall make provisions, at his expense, to furnish and maintain at the Steel fabrication shop acceptable office space with adequate light and a telephone for the exclusive use of personnel performing shop inspection for the District.

This office space shall be furnished with the following:

No. DESCRIPTION

- 1 Drawing table
- 1 Metal, 4 drawer file cabinet (15" drawer width)
- 1 Desk
- 2 Chairs

(C) PRECAST FACILITIES. The Inspector shall have full access at all times to all parts of the yard where units to be inspected are being constructed. The Contractor shall furnish the necessary equipment and facilities for inspection of workmanship and physical tests. The Contractor shall provide for the Inspector a suitable office with all utilities including telephone service.

106.07 STORAGE OF MATERIALS

Materials shall be stored so as to insure the preservation of their quality and fitness for the work and shall be located so as to facilitate prompt inspection. When considered necessary, they shall be placed on concrete platforms or other hard, clean surfaces and not on the ground, and shall be placed under cover when necessary for proper protection. Materials from different sources of supply shall not be stored in the same stockpile unless approved by the Engineer.

Stockpiles of aggregate shall be built in horizontal layers not to exceed 3 feet in height. Each layer shall be completely in place before the next is started and shall not be of such height as to cause coning or segregation. Aggregates which become mixed or contaminated with soil or other foreign material when in stockpiles shall be rejected. Care must be used in removing the material near the base of the pile.

106.08 HANDLING OF MATERIALS

Vehicles used in transporting aggregates, portland cement, asphalt, or similar construction materials must be kept clean and free from all foreign matter, be in proper working condition and have strong, substantial bodies which will prevent the escape of materials during transportation. Any material shipped in a conveyance containing foreign material shall be rejected regardless of the quality of said materials as determined otherwise.

Aggregates shall be handled in such a manner as to prevent coning or segregation.

106.09 UNACCEPTABLE MATERIALS

All materials not conforming to the requirements and specifications shall be considered as unacceptable and will be rejected and be removed immediately from the site of the work. Rejected material shall not be used until the defects have been corrected and approved by the Engineer.

REFERENCE TESTS. In the event the Contractor demonstrates that the test results obtained from a sample taken to evaluate a particular lot appear questionable, the Contractor may request in writing that additional tests be taken of that lot. Upon receipt of the written request, additional samples will be randomly selected and an appropriate number of retests made.

If the results of the new tests indicate the material does not conform to the specifications and is not acceptable, the cost of the test shall be borne by the Contractor at the rate of \$200.00 per test.

106.10 MATERIAL SHORTAGES

The Contractor is advised to anticipate shortages of certain products particularly those containing steel, copper, aluminum, portland cement, and asphalt, and is urged to place orders as early as practicable to provide producers and suppliers with maximum lead time. If timely deliveries still cannot be assured from usual sources, alternative suppliers should be fully considered.

Reasonable time extensions, exclusive of further compensation, for delays due to such products being in short supply, will be granted only if delays are beyond the control of the Contractor, fabricator, or supplier and written evidence of such delays, satisfactory to the Engineer, is submitted concurrently with the delays and not after the fact.

106.11 MATERIALS ORDER

A completed materials order shall accompany each quantity and shipment of materials from issue point to the job site, and shall be delivered to the Inspector. Each materials order shall consist of an approved form serially numbered; additional information and certification shall be promptly furnished if requested.

A copy of each order shall be retained by the Inspector at material issue point. Payment may not be made for materials not accompanied by a proper materials order.

106.12 PROCESSING OF MATERIALS

All work shall conform to the appropriate provisions of the current Occupational Safety and Health

Standards (OSHA). The attention of those contractors furnishing and processing materials in the city is specifically directed to OSHA 29 CFR 1926.58 issued June 1986.